REMARKS

Claims 7 and 29 have been amended to limit the SiO_2/Al_2O_3 ratio of the H/β-zeolite of the adsorbent used in the adsorbent zone of the system for exhaust gas purification of the present invention to 110 to 290 and to include the limitation that the "β-zeolite retains 85 % or more of its specific surface area after being exposed to an exhaust gas durability test at 750 °C relative to its specific surface area prior to being exposed to the durability test." The upper limit of 290 of the SiO_2/Al_2O_3 ratio is supported by the data of Table 1 of the specification of the present application. The limitation regarding exhaust gas durability is based on the calculated value of Adsorbent-catalyst A shown in Table 1 on page 21 of the specification of the present application, i.e., (350/410) x 100 = 85 (%), and by the descriptions on page 7, lines 1-8, and page 13, lines 4-15, of the specification.

Claims 7, 8, 11, 12, 15, 17, 29 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 07-213910 (hereinafter "JP '910). The Office's position is that the H/β-zeolite having an SiO_2/Al_2O_3 ratio of 110 or more of the present invention is anticipated by the disclosure in JP '910 of a H/β-zeolite having an SiO_2/Al_2O_3 ratio of "100 or more" (Action, page 2, line 7 of item (2)).

This rejection is overcome by the amendments to the claims. First, it is noted that JP '910 discloses the use of a H/β-zeolite having an SiO_2/Al_2O_3 ratio of 50 to 2000. A range of SiO_2/Al_2O_3 ratio of "100 or more" is not explicitly described in JP '910. In the working examples of JP '910, a catalyst-adsorbent comprising a noble metal as a catalyst and β-zeolite having a SiO_2/Al_2O_3 ratio of 100 as an adsorbent is described. Such description is not a description of a range of "100 or more".

Second, JP '910 is silent on the thermal stability of the β-zeolite and, more particularly, does not disclose the unexpected thermal durability of an adsorbent containing an H/β-zeolite having an SiO_2/Al_2O_3 ratio of from 110 to 290 and at least one noble metal selected from Pt, Pd and Rh when used in an adsorbent zone positioned together with a catalyst zone in an in-line exhaust pipe of an internal combustion engine with said adsorbent zone being upstream of said catalyst zone with respect to flow of exhaust gas.

The only significance of the SiO_2/Al_2O_3 ratio of 50 to 2000 of the β-zeolite described in paragraph [0012] of JP '910 is as follows:

> "There are various kinds of zeolites, in the present invention, it is preferable to choose, as a zeolite usable for the present inventive method, those having a sufficient HC adsorption ability and high durability in

> a wide range of temperature from normal (ambient) temperature to a relatively high temperature in the atmosphere wherein water is present. Among them, it is preferable to use a zeolite having SiO_2/Al_2O_3 ratio of 50 to 2000. For example, mordenite, USY, β-zeolite, and ZSM-5 can be illustrated. If the SiO_2/Al_2O_3 ratio of mordenite, β-zeolite, ZSM-5 and USY is less than 50, the zeolite can not adsorb effectively hydrocarbons contained in the exhaust gas because water co-presented therein hinders the adsorption of hydrocarbons. On the other hand, if the SiO_2/Al_2O_3 ratio of mordenite, β-zeolite and ZSM-5 exceeds 2000, or USY exceeds 300, respectively, the hydrocarbon adsorption ability of the zeolite decreases. It is more preferable to mix two or more of zeolites having different pore sizes or pore structures to adsorb effectively various kinds of HCs in the exhaust gas."

(Emphasis applicants'). As can be understood from the above description, the criticalness of the SiO_2/Al_2O_3 ratio of the β-zeolites in the invention disclosed in JP-A-7-213910 is described only in terms of hindrance of hydrocarbon adsorption by water molecules in the exhaust gas and decrease in hydrocarbon adsorption.

The disclosure in JP '910 of the use of an H/β-zeolite having a broad range of SiO_2/Al_2O_3 ratio of 50 to 2000, when considered in light of the failure of JP '910 to disclose anything concerning thermal durability of the zeolites when exposed to exhaust gas of

high temperature for a long period of time and in light of the unexpected thermal durability of the adsorbent-catalyst containing an H/β-zeolite having an SiO_2/Al_2O_3 ratio of from 110 to 290 used in the system for purification of exhaust gas of the present invention, is not a disclosure with "sufficient specificity to constitute an anticipation under the statute" (see MPEP 2131.01(II)) of the H/β-zeolite used in the present invention having a narrow range of SiO_2/Al_2O_3 ratio of from 110 to 290 as recited in the rejected claims.

Removal of the 35 U.S.C. § 102 rejection is in order and is respectfully solicited.

Claims 7-8, 11-12, 15, 17, 19, 21-22, 26 and 29-30 are rejected as being unpatentable under 35 U.S.C. § 103(a) over WO 94/11623 in view of EP 661,098, EP 602,963 and JP 7-124468.

Claims 7-8, 11-12, 15, 17, 19, 21-22, 26 and 29-30 are rejected under 35 U.S.C. § 103(a) over EP 661,098 ("EP '098") in view of WO 94/11623.

Claims 7-8, 11-12, 15, 17 and 29-30 are rejected under 35 U.S.C. § 103(a) over EP 602,963 ("EP '963") in view of WO 94/11623.

Claims 19, 21-22 and 26 are rejected under 35 U.S.C. § 103(a) over EP '963 in view of WO 94/11623 and further in view of EP '968.

Claims 19, 21-22 and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '910 in view of EP '098.

These are the same rejections that were made in the Final Office Action dated May 31, 2005, and the Action dated November 16, 2004. The prior art cited in these rejections, however, regardless of how combined, fails to support a case of prima facie obviousness of the system for exhaust gas purification of the present invention.

The system for exhaust gas purification of the present invention as recited in the rejected claims is directed to the use of β-zeolite (identified as H/β-zeolite in the claims of the present application), which has excellent adsorption capability, in an in-line exhaust purification system of the type disclosed in EP-A-602963, EP-A-661098 and the like, which are owned by the assignee of the present application. β-zeolite useful as an adsorbent in the present invention is defined by its SiO_2/Al_2O_3 ratio, taking thermal stability of the adsorbent into consideration. That is, β-zeolite having a specified SiO_2/Al_2O_3 ratio as recited in the claims now on file in the present application, has a thermal stability which can retain the adsorption capability even when exposed to an exhaust gas of automobiles having a temperature of 750 to 850 °C for 100 hours under actual driving conditions.

Prior Art vs. Present invention

(1) EP-A-602963 and EP-A-661098

These documents disclose the use of zeolites having a SiO_2/Al_2O_3 ratio of 20 or more (Si/Al ratio of 40 or more) in the purification systems disclosed therein. Various types of zeolites inclusive of ZSM-5, USY, β-zeolite, silicalite, and metallosilicate are exemplified. However, there are no concrete examples wherein β-zeolite is used as an adsorbent therein. Moreover, these documents are silent concerning the thermal durability of any of the zeolites disclosed therein.

These documents also disclose the combination of a noble metal as a catalyst and an adsorbent wherein a zeolite other than β-zeolite is used as the adsorbent, i.e., a catalyst-adsorbent. However, again there are no concrete data as to the thermal durability of the zeolites used therein.

As can be understood from the above discussion, there is in EP-A-602963 and EP-A-661098 nothing to suggest the importance of the SiO_2/Al_2O_3 ratio in zeolites to judge thermal durability as an index for long-lasting adsorbtion capability after exposure for a long period of time to an actual exhaust gas.

(2) WO 94/11623

This document teaches the use of β-zeolite having a SiO_2/Al_2O_3 ratio of 25 to 500 in an apparatus for treating an engine exhaust gas. However, it does not mention the use of the zeolite as a catalyst-adsorbent. (The present application is restricted to a catalyst-adsorbent where a β-zeolite having a specified SiO_2/Al_2O_3 ratio is used as the adsorbent). The SiO_2/Al_2O_3 ratio in WO 94/11623 is used merely to define the acidity. Indeed, there are no data regarding thermal durability described in WO 94/11623.

It is further noted that the working examples in WO 94/11623 are directed to a system provided with heat exchange means. There are no working examples wherein the system is not provided with heat exchange means.

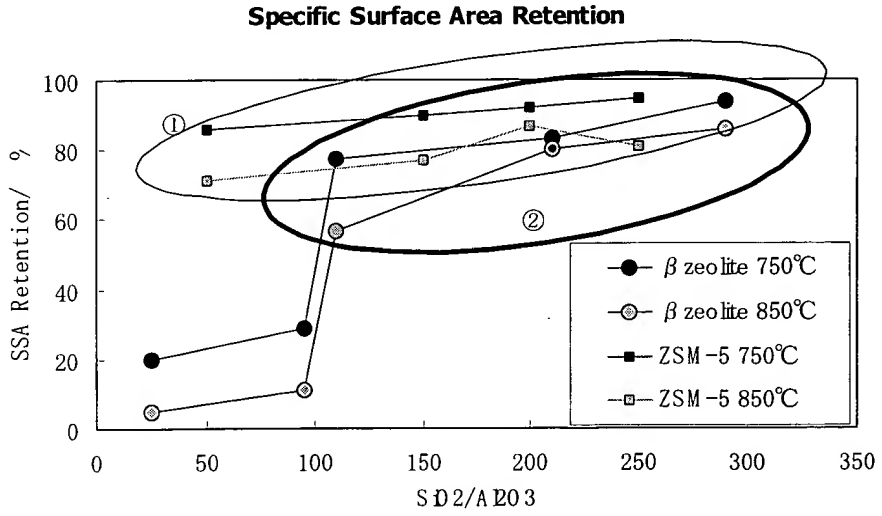
Criticalness of SiO_2/Al_2O_3 Ratio in the Present Invention

The present invention, as noted previously, is directed to an exhaust gas purification system using β-zeolite having excellent adsorption capability for use in an adsorbent-catalyst in the system. As a result of extensive studies, the applicants found that β-zeolite having a SiO_2/Al_2O_3 ratio of 100 or more and, especially, 110 to 290, can show unexpectedly good persistence in the adsorption capability of HC even when exposed to a high temperature for a long period of time in an in-line system, as is

demonstrated by the data in Table 1 of the present application. None of the references cited by the Office teaches or suggests criticalness of the SiO_2/Al_2O_3 ratio with respect to thermal durability.

The criticalness of the SiO_2/Al_2O_3 ratio of the β-zeolite with respect to thermal durability is illustrated in the chart below.

As can be taken from the chart, it has been confirmed that a β-zeolite, the SiO_2/Al_2O_3 ratio of which is 110 or more and within the range circled by circle 2, can exhibit unexpectedly superior thermal durability in the system for exhaust gas purification of the present invention. ZSM-5, having a SiO_2/Al_2O_3 ratio within the range circled by circle 2, exhibits good thermal stability but has inferior adsorption capability.



It is noted that the above chart is based on the data of Table 1 of the declaration under 37 C.F.R. § 1.132 submitted with the response filed in this application on April 21, 2003. The data of Table 1 of the declaration under 37 C.F.R. § 1.132 filed on April 21, 2003, were calculated from the thermal durability data identified in Table 1, page 21, of the present application. The thermal durability data of Table 1 of the application were obtained using the method described on page 13, lines 4 to 15, of the application.

Rejections

Referring to the rejections of the claims of the present application as being obvious under 35 U.S.C. § 103(a) over the combinations of WO 94/11623 in view of EP-A-661098, EP-A-602963 and JP-A-7-124428; EP-A-661098 in view of WO 94/11623; EP-A-602963 in view of WO 94/11623; EP-A-602963 in view of WO 94/11623 in further view of EP-A-661098 and JP-A-7-213910 in view of EP-A-661098, applicants respectfully submit that none of these combinations provides the necessary motive to a person of ordinary skill in the art to pick and choose H/β-zeolite having an SiO_2/Al_2O_3 ratio of 110 to 290 for use as an adsorbent of an adsorbent-catalyst in an in-line exhaust system.

In WO 94/11623, β-zeolite is used merely as an adsorbent. In the case of an adsorbent, the β-zeolite is not exposed to a higher temperature, compared with the case wherein β-zeolite is used together with a catalyst like the one disclosed in EP-A-602963, for example. β-Zeolite is exposed to a higher temperature when used together with a catalyst because the combustion of HC adsorbed during a cold start repeatedly occurs. Thus, since there is no description as to thermal durability in WO 94/11623, an ordinary artisan would not be motivated to use β-zeolite disclosed in WO 94/11623 in an in-line system as disclosed, for example, in EP-A-602963. In this respect, it is noted that the heat exchange means which definitely moderates the heat generated by combustion of the HC adsorbed is employed in all of the working examples of WO 94/11623. Therefore, without having a proper knowledge as to the thermal durability of β-zeolite, an ordinary artisan could not reasonably predict the effects of the use of H/β-zeolite having an SiO_2/Al_2O_3 ratio of 110 or more and, particularly, 110 to 290, as an adsorbent of an adsorbent-catalyst in an in-line exhaust system.

The references cited by the Office, therefore, alone of in any combination, cannot properly support a case of prima facie obviousness under 35 U.S.C. § 103(a) of the claims of the present application.

Notwithstanding the insufficiencies of the references to support prima facie obviousness of the in-line exhaust gas purification system of the present invention which includes an adsorbent-catalyst in which the adsorbent contains an H/β-zeolite having an SiO_2/Al_2O_3 ratio of 110 or more, the data of Table 1 of the present specification and that of the 132 declaration filed April 21, 2005, show that the H/β-zeolite having an SiO_2/Al_2O_3 ratio of 110 to 290 provides unexpectedly superior thermal durability such that the adsorbent can maintain high adsorption capability of HC even when exposed to high temperatures for a long period of time. These data are commensurate in scope with the present claims and are sufficient to rebut any prima facie obviousness alleged to be supported by the prior art.

Removal of the 35 U.S.C. § 102 and 35 U.S.C. § 103(a) rejections of the claims is believed to be in order and is respectfully requested. Issuance of a Notice of Allowance is also requested.

The foregoing is believed to be a complete and proper response to the Office Action dated February 1, 2006, and is believed to place this application in condition for allowance. If, however,

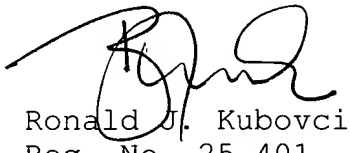
minor issues remain that can be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number indicated below.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 111833.

In the event any additional fees are required, please also charge our Deposit Account No. 111833.

Respectfully submitted,

KUBOVCIK & KUBOVCIK



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